

ten tenth-metres. The region of spectrum studied extends from about λ 2500 to λ 7000.

In the production of the arc spectrum, rods of the metal were used as poles whenever possible, though in many cases carbon electrodes were employed, and scraps of metal or salts of the metal volatilised on them. The selection of carbon as electrodes seems to us a very unfortunate one, as it is next to impossible to disentangle the real spectrum of a substance from the structure of the carbon bands. Surely a better method would be to use poles of some inexpensive metal the spectrum of which is a fairly simple and characteristic one, such as zinc, aluminium, or silver.

Among the spectra represented in the charts are several, such as boron, arsenic, the rare earths, the platinum group, phosphorus, selenium, which are reproduced here for the first time. The previously existing records relating to some of these were very meagre, and those now published will be distinctly useful. For some of the gaseous elements vacuum-tube spectra have been obtained.

The authors have not given—and it seems unnecessary to do so—complete lists of wave-lengths, but have confined themselves to a selection of the most characteristic lines for each element. The wave-lengths of these are given only to the nearest Ångström unit or tenth-metre, which is scarcely of sufficient precision for modern spectroscopic research. A chapter of notes is given at the end of the text, touching on such points as varying numbers of lines, kinds of spectra, character of lines, division into pairs, triplets, and series, lines specially prominent in any particular light source, &c.

Notable amongst the few elements not investigated by these observers is scandium. This is unique among the rarer metals in the prominence of its lines in various celestial spectra—notably the chromosphere and stellar types of intermediate temperature—and a reproduction of its complete spectrum would therefore have been of interest.

The reproductions are generally excellent; exception must be taken, however, to that of the solar spectrum, which, apparently included as a reference spectrum, is practically useless. Upon the whole, the production of the atlas is very creditable to the authors, and without being in some ways so elaborate a nature as Crew's or the recently published atlas of Eder and Valenta, it will, through its uniform treatment of all the elements investigated, be useful, as the authors surmise, to the physicist, chemist, and astronomer.

F. E. B.

OUR BOOK SHELF.

Précis d'Hydraulique—La Houille Blanche. By Raymond Busquet. Pp. viii+375. (Paris: J. B. Baillière et Fils, 1905.) Price 5 francs.

THIS book forms one of a series of little volumes which are being issued under the title of "Encyclopédie Industrielle," and treats of the principles of hydraulics and their applications, which possess an enhanced importance in view of the recent great extension of the employment of water-power for industrial purposes, resulting from the discovery that it can be economic-

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ally transmitted to a distance when converted into an electric current. Thus, by the development of electrical transmission, it is now practicable to use waterfalls and water stored up in reservoirs, in remote mountain valleys, as sources of power for towns, of which the Falls of Niagara, supplying electrical energy to Buffalo, furnish so notable an instance; and the author has given the name of "La Houille Blanche," or white coal, to this source of power.

The subject is discussed in five chapters, dealing successively with fundamental laws, flow of liquids in pipes, flow of liquids in open channels, hydraulic motors, and creation of a fall of water; and the text is illustrated by forty-nine diagrams and drawings. The hydraulic problems relating to the utilisation of water-power are solved by aid of arithmetic and simple geometry; and the author's aim has been, by making the book neither purely descriptive nor wholly didactic, to render it serviceable to a large number of persons. In the chapter on motors, the different forms of waterwheels and the various types of turbines are described; and, finally, the principle of the hydraulic ram is explained, as being distinct from motors, and yet transforming the fall of water into useful work by raising some of the water to a considerable height. Though reservoirs have been, and are being, formed by constructing high masonry dams across narrow gorges in the valleys of mountain streams, with the object of furnishing water-power, the final chapter of this book relates exclusively to the erection of a masonry weir across rivers, with the necessary sluiceway, closed by wooden panels, for the discharge of floods, by which the ordinary water-level of the river is raised so as to enable water to be drawn off into a branch canal for supplying water-power; and it deals mainly with the requisite calculations of the flow of the river, the discharge through the sluices, the pressure on the panels, the fall available, and the section of the branch canal and of its side retaining walls. The author entertains great expectations as to the future of water-power, and considers that, whereas last century was the century of steam, the twentieth century will be called the age of water-power, or white coal.

Catalogus Mammalium, tam viventium quam fossilium. By E. L. Trouessart. Suppl. part iv., Cetacea to Monotremata. (Berlin: Friedländer and Son, 1905.) Price 8s.

WE have much pleasure in congratulating the author on the completion of the first quinquennial supplement, whereby an absolutely invaluable work is brought well up to date, or, rather, as nearly up to date as is possible in undertakings of this nature. We notice that in the part before us references are given in the case of well-known species to passages in which they have been recently mentioned—a plan which cannot fail to be of the greatest assistance to students.

In accordance with the recent changes in nomenclature, the titles adopted for several genera differ from those employed in the original issue, as, for instance, *Orcinus* in place of *Orca*, on account of the preoccupation of the latter term. In the case of the *Edentata*, the list of names proposed by Dr. Ameghino for South American Tertiary forms looms very large, and, we fear, occupies much more space than it is really entitled to claim. In this connection it may be noted that the author follows Dr. Wortman in classing the North American Eocene *ganodonts* as ancestral types of the true *edentates*, Prof. W. D. Scott's recent opposition to this view probably not having been published in time to receive

notice. The classification of the ground-sloths is much more complicated than the one adopted by older writers, the Megalotheriidae being now split up into a number of family groups. Very noteworthy is the inclusion among the Monotremata of an extinct South American family, the Dideilotheriidae, with four generic modifications, as if this be justified it has a most important bearing on former land connections between the southern continents. We confess, however, to a certain amount of hesitation in accepting the determination of these South American fossils until it has been confirmed by a palæontologist of unquestioned authority. In retaining provisionally the South African Tritylodon among the mammalia, Dr. Trouessart is in accord with opinions lately expressed by Dr. R. Broom.

R. L.

How to Know Wild Fruits: a Guide to Plants when not in Flower by Means of Fruit and Leaf. By Maude Gridley Peterson. Pp. xliii+340; illustrated. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd.) Price 6s. 6d. net.

"YE shall know them by their fruits" might well have served as the fore-word to this little volume. It deals only "with those plants which bear attractively coloured fruits," and might, therefore, be classed by the reviewer among that very large class of books which are made to look at rather than for any more serious purpose. The very first chapter, on "Adaptations of Fruits and Seeds for Dispersal and Protection," serves to dispel that notion. It consists only of some half-dozen pages, but those pages are instructive, and, better still, suggestive. Then comes a list of "definitions," few in number, but adequate to a book of these pretensions, especially as it is supplemented by a glossary at the end. "A Guide to the Plant Families Represented" comes next in order, and consists of an analytical table by means of which the several families may be discriminated by the observation of the variations in the character of their fruits. This seems to be carefully compiled, and is, so far as we have seen, accurate, but its value can only be tested by actual use in the field.

In the second table the families and species are grouped according to the colour of their fruits. Thus the monocotyledonous families are arranged according as the colour of the fruits is red, reddish-purple, green, black, or dark-purple, or blue. Of course, this is a highly artificial mode of grouping and one subject to exception, but if these circumstances be borne in mind the table will be found useful.

Coming now to the individual plants, which are all North American, the author gives a pretty full description of each, beginning with the fruit and passing on to the foliage and flowers. These descriptions might have been materially abridged and comparison rendered easier by the omission of unnecessary particles and verbs. In this matter the example of the author's fellow-countryman, Asa Gray, might have been followed. Moreover, they are not always botanically accurate; the "fruit" of the yew, for instance, is only remotely "drupe-like," and is certainly not a "drupe," as it is said to be in the same paragraph. Conversely, the leaves of the yew are really spirally arranged, but appear to be disposed in two planes only.

It would obviously be unfair to treat this book as if it were intended as a botanical text-book, but as a help to the beginner and a means of stimulating observation it may be commended. It is well got up, remarkably free from misprints, appropriately illustrated, and provided with an index of vernacular names and one of the Latin designations of the plants described.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

The Kangra Earthquake of April 4, 1905.

THERE have been certain papers on Indian geological questions recently published in the *Neues Jahrbuch* and associated *Centralblatt für Mineralogie, Geol. und Pal.* (Stuttgart), in which either the data or the deductions, generally both, have been unsound. In most cases the authorship alone has been sufficient to enable us to separate those papers that are worth careful study from those that are not even worth the time necessary to read. But in the latest production one of the editors of the journal appears as a joint-author, and one wonders consequently whether the papers we have been discarding in India as untrustworthy are, after all, normal or accessory constituents of a periodical which all geologists have regarded hitherto as essential to a working library.

The paper I now refer to appeared in the *Centralblatt* No. 11 (June), entitled "Das Erdbeben im Kangra-Tal (Himalaya) von 4 April 1905," by E. Koken and F. Noetling. The authors take eight pages of text and a map to demonstrate the unusual features of scientific interest shown by the recent earthquake—the time of its occurrence, the remarkable variation in the rate of transmission of the earthquake waves in different directions, the peculiar distribution of the isoseismal lines, and the exceptional shape of the meizoseismal area. The whole of this "scientific" discussion is built on a few newspaper cuttings, in the collection of which the authors have not been sufficiently industrious to escape certain tell-tale misprints which appeared only in the newspapers of the Presidency farthest removed from the earthquake centre. One example will be sufficient to illustrate the care exercised in collecting and checking their data.

The authors on p. 336 refer to a town named Tagarmalli as only very slightly damaged, and they consequently adopt this point, which they determine to be fifty miles from the epicentre, as the maximum extension eastwards of the meizoseismal area. As a matter of fact, no such place as Tagarmalli exists, and no such name appears in any of the gazetteers of India; the most casual attempt at verification would have shown the authors that they were basing their elaborate deductions on a misprint which appeared in one newspaper only. In one of the Lahore papers the names of the two places Nagar and Manali, twelve miles distant from one another in the Kulu valley, became contracted by the printer's devil to Nagarmalli, and in this form it was telegraphed to Bombay (*Times of India*, April 14) and to Calcutta (*Englishman*, April 14); but by the accidental omission of a single Morse's dot the word reached Madras as Tagarmalli (*Madras Mail*, April 15, and telegraphic summary, April 14). Having found the clue to the authors' source of data, we find it easy to explain other equally remarkable statements in the paper. In an earlier part of their paper (p. 334) they refer to the complete destruction of the place Nagar (Naggar), without suspecting that it was one of the roots of their mythical Tagarmalli; but on this occasion they have removed the little capital town of Kulu, and, for purposes of seismological reasoning, have carried it over the snowy range into the Kangra valley. To base a series of scientific deductions on a few newspaper cuttings may satisfy the devotee of precision (*alias* accuracy) in Germany, but to neglect the simple means of verifying their facts provided by the splendid maps of the Punjab, the complete gazetteers, or even the fourpenny postal guide obtainable in nearly every village, shows a carelessness that deserves the contempt of every scientific man.

But, after all, it is not the basis of data so much that is at fault, though even the purchase of a few more newspapers would have saved the authors from most of their pitfalls; it is the "scientific" superstructure that is so discreditable. When the authors noticed that the earthquake was recorded by the Bombay seismograph at